

Part III.F Women's Nutrition

- Percent of pregnant women who gain at least one kg per month in the last two trimesters of pregnancy
- Percent of non-pregnant women of reproductive age who have low body mass index (BMI)
- Percent of women with low mid upper arm circumference (MUAC)
- Percent of service delivery points with adequate supplies of mineral/vitamin supplements
- Percent of pregnant women who receive the recommended number of iron/folate supplements during pregnancy
- Percent of women of reproductive age with anemia
- Percent of women living in households using adequately iodized salt
- Percent of women who receive vitamin A supplementation in postpartum visits
- Percent of women with low serum vitamin A concentration
- Percent of women with night blindness in last pregnancy

Nutrition deficiencies diminish not only the individual woman's quality of life but also that of her children, family, and community because women are often income earners, food producers, and family caretakers. Adequate nutrition is vital both to the health and reproductive outcomes of women and to the health, survival, and development of their children. However, women's nutrition programs lack the resources often available to other nutrition and public health programs, in part because undernutrition in women often does not manifest itself through conspicuous outward signs. Nutrition often receives the lowest priority in terms of money spent (on either programming or evaluation), especially where nutrition interventions are embedded in a broader antenatal or MCH program. Often policymakers, program designers, and service providers direct their interest and efforts to "more pressing" issues.

Nutritional intervention programs tend to target the following three problems: (1) general nutritional deficiency (e.g., inadequate dietary intake), (2) specific micronutrient deficiencies, and/or (3) diseases directly affecting nutritional outcome (e.g., malaria, helminths). Intervention strategies addressing the first two problems include provision of supplements (food supplements, micronutrients), food production strategies, food-based strategies (genetic engineering, agricultural interventions), and dietary behavior change. Interventions to combat malaria and parasitic diseases include presumptive and therapeutic treatment. The indicators in this section reflect the tendency of nutritional interventions to date to promote women's nutrition as a means of improving pregnancy outcomes, rather than as an end unto itself. We anticipate certain adaptations in the indicators to monitor women's nutrition programs, as interventions increasingly focus on the nutritional status of women – because of the benefits improved nutrition will have on the well-being of the individual woman as well as of her child(ren).

At the program level, there is growing awareness that health and nutrition programs implemented well before women become pregnant will have long-term impacts

on both the mother and child, one reason for which international donor agencies have demonstrated a renewed interest in women's nutrition and nutrition education. Intervention strategies need to go beyond the conventional approach of providing services to pregnant women and mothers through traditional maternal and child health care programs; they must also take advantage of the opportunities presented through community-based approaches (village volunteers, community events as a venue for health and nutrition messages) and must link nutrition with initiatives implemented in other sectors (e.g., agriculture extension, education, micro-credit).

This *Compendium* presents women's nutrition as a discrete topic. Yet at the field level, programmatic activities involving women's nutrition are usually integrated ("bundled") with other health services. Indeed, women's nutrition is intricately linked to other health outcomes. For example, when parasitic diseases and malaria diminish the nutritional status of women, the health status of the newborn suffers. The natural link between women's nutrition and safe motherhood is further enforced by the programmatic reality that prenatal visits allow the public health establishment to reach pregnant women of reproductive age with other health interventions. A woman's nutritional status also influences the body's ability to fend off infections, including opportunistic infections associated with HIV. The prevalence of AIDS in a given area in turn affects women's nutritional status, if the population becomes so depleted that it cannot accomplish basic household activities because of illness, fatigue, loss of income, and increased medical expenses.

Nutrition also plays a key role in adolescent health programs. Nutritional intake during childhood and adolescence directly affects health and well-being at all stages in life. Well-nourished girls perform better in school and have a greater capacity for physical activity than do undernourished girls. Adequate nutrition in childhood also determines whether a young woman will reach her own childbearing years with adequate weight and nutritional status to produce a healthy child. Moreover,

nutrition-related interventions appear to be more effective in changing behavior among younger than older women; thus, investments in youth programming may lead to more sustainable behavior change over time.

This section focuses on two types of results: outputs measured at the program level (e.g., results among clients or other facility-based data) and outcomes measured at the population level. Because the latter requires data from Multi-Indicator Cluster Surveys (MICS), Knowledge, Practices, and Coverage (KPC) surveys, and DHS-type or other representative surveys of the population in the area of project activity, organizations with limited human or financial resources for program evaluation may find it unfeasible to gather population-based data. As is true in other areas of reproductive health, program-based and population-based data can provide very different information regarding coverage. For example, the different data may simultaneously reveal a high level of supplementation coverage of pregnant women attending prenatal clinics, but a very low coverage of pregnant women in the population (if relatively few pregnant women attended prenatal care). For the indicators mentioning both program- and population-based data as sources of data, this caveat warrants attention.

The section does not explicitly cover the indicators most useful for diagnostic or screening purposes (i.e., to identify vulnerable populations in need of food supplementation), although two indicators – **Percent of Non-pregnant Women of Reproductive Age Who Have Low Body Mass Index (BMI)** and the **Percent of Women with Low Mid Upper Arm Circumference (MUAC)** – can serve this end. We include two biological markers – serum vitamin A and hemoglobin – that programs with budgets sufficient to collect such data may find useful to measure. However, many programs may opt to omit them, because they can be more expensive, time-consuming, and logistically difficult to collect than other nutrition indicators. Different intervention priorities, such as the use of multi-vitamins or calcium supplements, are expected to gain increasing prominence in the coming years. However, because these interventions remain largely experimental, we have omitted indicators for them in the *Compendium*.

Women's nutrition differs programmatically from other RH areas in that the causal chains are longer and more complex, in part because of confounding biological factors. As such, reaching members of the intended audience with the intervention does not guarantee the expected effect. In family planning programs, one assumes that when a woman uses an effective method of contraception correctly, she will avoid pregnancy. By contrast, in the case of women's nutrition, a thin woman (and her thin child) may need food energy but fail to respond to increased food intake because of HIV infection, TB, or malabsorption. Thus, when program planners design and evaluators assess programs, they must specify intended effects and the size of the expected effects, taking into consideration contextual factors. The selection of indicators then follows.

The selection of indicators depends upon the type of program: national versus small area, formative/pilot versus ongoing. In the area of women's nutrition, formative/pilot studies continue to play an essential role in understanding the multi-causal nature of most nutrition problems, and indicators based on biochemical data can be very useful in this context. Such measures may be less practical for national programs. However, the DHS has demonstrated the feasibility of collecting samples using the finger-prick technique to measure the prevalence of anemia at the national level.

Where possible, evaluators should look for data that already exist or will be collected as part of larger surveys using widely accepted data-collection methods, such as the DHS, MICS, and KPC surveys. While very little research has tested the validity and responsiveness of women's nutrition indicators, a recent analysis of data from the Philippines (Adair, 1998) demonstrates the utility and importance of this type of research.

The inclusion of women's nutrition in the *Compendium* reflects a growing interest in and recognition of the importance of this subject among reproductive health professionals. As programs designed to improve women's nutrition become more widespread, the science for evaluating them will advance accordingly. In anticipation of greater interest in evaluation in this area, we outline a number of the methodological challenges for evaluating women's nutrition programs.

Methodological Challenges of Evaluating Women's Nutrition Programs

- **Nutrition is a complex area to evaluate because of the multiple determinants.**

Numerous other sections of the *Compendium* discuss the problems of establishing a causal relationship between the intervention in question and the desired outcome. This challenge applies equally to programs on women's nutrition because of the multi-sectoral nature of determinants of poor nutrition as well as because of the interventions necessary to improve nutritional status. That nutritional interventions are rarely carried out in isolation of other health programs, further complicates establishing a definitive cause-and-effect relationship.

- **The cut-off points for indicators of a woman's nutritional status can vary according to the period within the reproductive cycle (i.e., during pregnancy and lactation).**

The ideal indicator of women's nutritional status would have the same cut-off points or, at least, cut-off points clearly identified for different periods during the reproductive cycle for all women of reproductive age in a given population. However, this is often not the case. For example, there is no clear agreement on the cut-off points for body mass index (BMI) during pregnancy and lactation. Furthermore, applying the correct cut-off points depends on determining whether a woman is pregnant or not; such a determination is sometimes impossible in a program setting.

- **Because programs with explicit objectives to improve women's nutritional status have been rare, program evaluation in this area is also relatively underdeveloped.**

The field of program evaluation in family planning developed in large part in response to critics who cited the millions of dollars being spent in this area and who questioned the effectiveness of programs to achieve results. In contrast, in terms of women's nutrition, a fair amount of work has demonstrated the efficacy of specific treatments, but far less evaluation has been conducted on the effectiveness of nutritional interventions at the program level. One possible reason is that women's nutrition programs have not been challenged to demonstrate their effectiveness in terms of health

outcomes (although the evaluation of micronutrient interventions is somewhat an exception to this generalization). Moreover, given the relatively low levels of funding in this area, few have advocated using limited resources on sophisticated methods of evaluation. The trend has been to invest available funds in program activity rather than data collection and analysis.

Much of the evaluation of women's nutrition interventions to date has consisted of process and output type measures (e.g., number of talks given, number of women visiting the center, number of food supplements distributed). Where resources are limited, these measures are useful to track program activity, and (in the case of micronutrient supplements) they serve as proxies for population-level measures especially in the absence of outcome measures. However, these measures of process and output are only as good as the management information systems that generate them. The indicators presented in this *Compendium* move beyond process to the results expected from these programs, either at the program or population level.

Organization of this Section

As mentioned above, women's nutrition programs aim to (1) improve overall nutrition status by increasing caloric intake, decreasing energy expenditure, or ensuring better care, (2) provide micronutrient supplements or access to fortified foods – primarily iron, iodine, and vitamin A (and more recently multiple micronutrient supplements), and (3) manage diseases directly affecting nutritional outcomes, such as malaria and helminths. The beneficiaries of these efforts tend to be eligible women (and their children) in a defined geographical or administrative area or to be clients of a particular NGO. The indicators in this section provide useful information on:

1. The performance of the program in delivering these services (outputs measured at the program level);
2. The results achieved in terms of nutritional status
 - (a) in women participating in the program (outputs measured at the program level), and/or
 - (b) among relevant subgroups of the general public (outcomes measured at the population level, through representative sample surveys).

The **performance** indicators in this section reflect common interventions for women's nutrition programs focusing on women during pregnancy and the post-partum period.

Interventions for pregnant women include:

- Iron/folate supplementation (and where applicable, multiple micronutrient supplementation);
- Malaria prophylaxis;
- Anthelmintic treatment; and
- Increase in food intake.

Interventions for women in the post-partum period include:

- Vitamin A supplementation;
- Iron/folate supplementation; and
- Increase in food intake.

Indicators to measure the **results** of these interventions among clients and/or relevant subgroups of women in the general population include:

All women:

- Body mass index (to detect thin and overweight women);
- Mid-upper arm circumference (MUAC);
- Availability of iodized salt in the household; and
- Serum retinol.

Pregnant women:

- Weight gain of at least one kilo/month in last two trimesters of pregnancy; and
- Night blindness (indicative of vitamin A deficiency).

Table III.F.1 provides an overview of this section. The indicators are ordered by type of intervention (programs to increase caloric intake and micronutrient supplementation including iron, iodine, vitamin A as well as iodine fortification). The indicators on prophylaxis or presumptive treatment for malaria and helminths are relevant in this section, but appear under Part III.D on Safe Motherhood. Within each type of intervention, those that measure program performance are presented first, followed by those that measure nutritional status among clients and/or subgroups of women in the general population.

Table III.F.1 Women's Nutrition: Types of Interventions, Indicators of Program Performance, and Indicators of Nutritional Status

Type of Intervention	Measures of Program Performance (titles abbreviated)	Results in Terms of Nutrition Status (titles abbreviated)
Interventions to increase energy intake		Weight gain of at least one kg/month in pregnant women Body Mass Index (overweight, underweight) Mid upper arm circumference
Micronutrient Supplementation <ul style="list-style-type: none"> • Iron • Iodine • Vitamin A 	Adequacy of supplies at SDP (iron, iodine, Vitamin A) Iron folate supplementation during (last) pregnancy Percent of women living in households with iodized salt Vitamin A supplementation in postpartum visits	Percent of women with anemia Percent of women with low-serum Vitamin A concentration Percent of women with night blindness in last pregnancy
Management of diseases directly affecting nutritional outcomes <ul style="list-style-type: none"> • Malaria • Helminths 	Percent of women receiving treatment during pregnancy Percent of women receiving treatment during pregnancy	

Indicator

PERCENT OF PREGNANT WOMEN WHO GAIN AT LEAST ONE KG PER MONTH IN THE LAST TWO TRIMESTERS OF PREGNANCY

Definition

The percent of women gaining at least 1.0 kg per month in the second or early third trimester of pregnancy (Krasovec and Anderson, 1991a and 1991b)

This indicator is calculated as:

$$\frac{\text{\# of women gaining at least 1.0 kg per month in the second and third trimesters of pregnancy}}{\text{Total \# of pregnant women}} \times 100$$

Data Requirements

Two or more recordings of weight after the third month of pregnancy

Data Source(s)

Service statistics, prenatal cards, or other clinic-based records; sample of home-based records reviewed

Purpose and Issues

This indicator measures weight gain during pregnancy, one of the most critical factors in determining both birth outcomes and maternal nutritional outcomes of pregnancy. Weight gain is particularly important for women who are underweight prior to pregnancy and for women who are pregnant during times of acute nutritional stress, such as famines or seasons of food scarcity. Underweight women (Body Mass Index <18.5) need to gain between 12.5 and 18 kg during pregnancy in order to lower their risk of producing low-birth-weight (LBW) babies (IOM/NAS, 1990). Average weight gains for women in developing countries (5-9 kg) are much lower than these recommendations, and much lower than averages for developed-country women (10.5-13.5 kg). At a minimum, women should gain at least 1.0 kg/month during the last two trimesters. A WHO report (1995a) indicates that a higher gain of 1.5-2.0 kg per month improves infant outcomes (LBW and IUGR).

Low weight gain during pregnancy is associated with LBW, intrauterine growth retardation (IUGR), gestational duration, fetal and neonatal mortality, and maternal nutritional status postpartum.

This indicator's strength is that it reflects the importance of routine and high-quality antenatal care through multiple prenatal visits. Moreover, it focuses the attention and care of both the health worker and the woman on weight gain and weight gain promotion rather than simply on determining maternal nutritional status at any one point in time.

This indicator's major limitation is that the population covered may not fully represent the intended population, because a very small percentage of women in many developing countries routinely attend prenatal services. Frequent attendees tend to be either women with pregnancy complications or women of higher socio-economic and educational status. The difficulty in monitoring maternal nutrition during pregnancy is that many women do not get antenatal care, or they have only one visit late in the pregnancy.

This indicator is most often used by NGOs or PVOs working in a limited geographic area. Evaluators face difficulty obtaining this information from large public health centers in developing countries that keep antenatal records. An adult scale and antenatal cards are essential to obtain this information.

Indicator

PERCENT OF NON-PREGNANT WOMEN OF REPRODUCTIVE AGE WHO HAVE A LOW BODY MASS INDEX (BMI)

Definition

Low Body Mass Index (BMI), the ratio of weight to height (kg/m²), measures chronic energy deficiency or “thinness” in non-pregnant women

The standard cut-off for non-pregnant, non-lactating women aged 15-49, determined by the International Dietary Energy Consultative Group, is a BMI of 18.5. Further refinements in levels of CED are:

- Grade I: 17-18.4 (mild);
 - Grade II: 16-16.9 (moderate); and
 - Grade III: <16 (severe)
- (James et al., 1988).

This indicator is calculated as:

$$\frac{\text{\# of non-pregnant women with a BMI below 18.5}}{\text{Total \# of non-pregnant women between the ages of 15-49}} \times 100$$

Data Requirements

Weights (in kilos) and heights (in meters squared) of non-pregnant women of reproductive age

Data Source(s)

Population-based surveys

Purpose and Issues

The advantage of BMI, a well-accepted measure of energy deficiency among women, over weight for height as a measure of thinness is that it does not require reference tables for interpretation. However, it may present difficulties to some field workers in service delivery programs because of the mathematical calculations required. Tools (e.g., tables, wheels) have been developed to assist with these calculations.

Rapid changes in anthropometric measures as a result of the adolescent growth spurt complicate assessing the nutritional status of those below 18 years of age (i.e., it increases the variance in BMI). Despite this caveat,

BMI is nonetheless recommended for use with adolescents. A related (additional) indicator to BMI is the woman’s weight, which reflects both acute and chronic nutritional stresses. The cut point for identifying women who are undernourished is 45 kg (ACC/SCN, 1992).

Because BMI varies with body shape or the Cormic index (sitting height divided by standing height), some have argued that data on sitting height should be collected where possible and that the BMI should be adjusted for the Cormic index. However, others consider this adjustment to be impractical, given that the calculation of BMI itself is methodologically challenging to some field workers.

Evaluators should use caution when they interpret adult anthropometric results because of the lack of validated outcome data for interpreting the results. The evaluators should disaggregate data by age and lactational status.

Although this indicator specifies non-pregnant women, BMI also is commonly used to identify women who need to gain more weight during pregnancy in order to improve infant outcomes of pregnancy (low birth weight, intrauterine growth retardation, and perinatal mortality). It is also used to monitor women during pregnancy.

An alternative indicator to BMI in situations where it is impractical to get weight and height data is that for middle-upper arm circumference (MUAC), which is based on a single anthropometric measure. (See next indicator, **Percent of Women with Low Mid Upper Arm Circumference**).

BMI is also useful for identifying women who are overweight (BMI > 25.00 kg); a BMI > 29.00 is considered obese (IOM, 1990). The prevalence of overweight women is increasing rapidly in certain developing countries. However, we are not aware of large-scale interventions to reduce the percentage of overweight women in a developing country which have been evaluated

based on BMI. For this reason, we do not include BMI to measure overweight as a separate indicator in this *Compendium*.

Gender Implications of this Indicator

Limiting food intake during pregnancy is a gender-based, harmful cultural practice theoretically linked to the idea that limiting weight gain will limit the infant's head circumference, so that the birth will be less difficult. The practice primarily occurs in settings such as South Asia, where women eat last and least, even when not pregnant. Thus, women frequently enter pregnancy undernourished and become more so throughout pregnancy. In reality, undernourished pregnant women are at much greater risk of poor birth outcomes than are nourished women. They are more likely to be vitamin A-deficient and to be anemic, both of which also increase the risk of maternal and fetal morbidity and mortality. Some nutritionists believe it beneficial to limit weight gain during pregnancy; also, they may use this rationale to save face for being poor and unable to eat more. More efforts are needed to educate husbands, mothers-in-law, and communities that pregnant women must eat more, not less, and that nutritious foods benefit both mother and fetus and lead to better birth outcomes.

Indicator

PERCENT OF WOMEN WITH A LOW MID-UPPER ARM CIRCUMFERENCE

Definition

The percent of women with a middle upper arm circumference (MUAC) below 22.5 cm (ACC/SCN, 1992)

This indicator is calculated as:

$$\frac{\text{\# of women with a mid upper arm circumference below 22.5 cm}}{\text{Total \# of women between the ages of 15-49}} \times 100$$

Data Requirements

A measure of MUAC in women of reproductive age (15-49)

Data Source(s)

DHS or other population-based surveys; the KPC₂₀₀₀ survey including the collection of data on the percentage of mothers with children under the age of two years who have a low MUAC

Purpose and Issues

MUAC is an anthropometric measure used primarily for screening, because it changes slowly in large populations. However, it is potentially useful for evaluating the impact of interventions in a given (limited) population.

The measure of mid upper arm circumference is a useful anthropometric measure because it's easily obtained in clinical settings or during population-based surveys. The tapes are portable and inexpensive, and persons with limited education (e.g., community workers, TBAs) can learn to take this measurement accurately. The measurement of MUAC not only yields useful data but also raises awareness about nutritional status among those participating in the study. In settings with limited infrastructure and resources, MUAC may be the only feasible anthropometric indicator to use. An additional advantage is that the same cut-off value can be used to define undernutrition in both pregnant and non-pregnant women because values change only slightly during pregnancy.

MUAC is primarily used for screening rather than evaluation purposes. MUAC is correlated with pre-pregnancy weight and may be useful for identifying pregnant women at risk of IUGR, especially where scales are not available (WHO, 1995a). Where used, the data should be disaggregated by age and reproductive status.

Cut-off values between 21.0 and 23.5 cm are consistently related to biological risk of LBW and fetal and infant mortality in Asia and Latin America; data are not available for Africa. Further validation of MUAC is needed.

Indicator

PERCENT OF SERVICE DELIVERY POINTS WITH ADEQUATE SUPPLIES OF MINERAL/VITAMIN SUPPLEMENTS

Definition

“Adequate supply” is the availability and quality of mineral/vitamin supplements (iron, iodine, and vitamin A) at the service delivery point (SDP) at the time of data collection. To compute adequacy, evaluators determine the number of individual doses (daily or otherwise) of acceptable quality supplements relative to the client population served. The evaluators should calculate each type of supplement (iron, iodine, and vitamin A) separately, because the frequency of doses and, therefore, the amount necessary depend on the type of supplement (i.e., daily iron supplements vs. single postpartum dose of vitamin A).

The quality of the mineral/vitamin supplement supply (iron, iodine, folate, and vitamin A) is acceptable if the supplements are labeled properly, not expired, and are stored under the recommended climatic and lighting conditions. The evaluators should assess adequacy of each type of supplement separately, because some products are often difficult to procure in a given country (e.g., iron/folate) in contrast to others more readily available (e.g., Vitamin A, provided by UNICEF).

This indicator is calculated as:

$$\frac{\text{\# of SDPs with an adequate supply of quality mineral/vitamin supplements}}{\text{Total \# of SDPs}} \times 100$$

Data Requirements

A count of the number of SDPs in the catchment area; a count of the potential client population(s) in the catchment area served at each SDP; a count of units of each supplement listed by form of the supplement (e.g., iron: tablets and drops; iodine: tablets and injectables; vitamin A: high- and low-dose capsules) of acceptable quality at the SDP; the volume of supply of each mineral/vitamin in terms of “individual doses;” and number of doses of each supplement judged (a) to be sufficiently well stocked and (b) of adequate quality (see operational definitions below).

Data Source(s)

Program records indicating the number of SDPs and the population in the catchment area; and inventory of each SDP (special study) and inspection of each unit of supplement to determine the number of supplements that are of acceptable quality

Purpose and Issues

This indicator is important at the program level to evaluate the extent SDPs have supplements that are both available and of acceptable quality to meet clients’ nutritional needs. For this indicator to be useful, evaluators must define the measurement of “adequate” and “of sufficient quality.” One measures sufficient quantity by estimating the size of the catchment area and the subgroup within that area in potential need of the supplement. One then calculates the average quantity of each supplement needed per recipient in the target population for a specific reference period. This approach allows a crude calculation of the “sufficient quantity” for each supplement. There is no universally accepted standard for measuring adequate supplies; however, evaluators should consider the type of supplement, the frequency of supply, and the amount of supply available at the SDP when they define adequacy.

Certain criteria for quality apply to all three supplements:

- Supplements should be properly labeled (supplement name, volume, usage, dosage, medical contraindications, and expiration date);
- Supplements should not have not expired; and
- Supplements should be stored in a cool, dry place, under conditions specified by the manufacturers.

Additional criteria for quality also apply to specific supplements, as follows:

- Iron: Iron tablets and drops are considered acceptable if at least 90 percent of the tablets in the bottle are intact, and if any other recommendations from the manufacturer on proper

storage are being followed; and

- Vitamin A: The quality of vitamin A supplements is considered acceptable if supplements are stored away from light between 0°C and 30°C, and liquid vitamin A is discarded if it has been open for more than two months.

This indicator requires that the supplements meet both criteria: of adequate quantity and of sufficient quality. Thus, evaluators assess the results of these two factors simultaneously to determine if a given SDP has an “adequate supply.”

This indicator measures the presence of products at service delivery facilities. It does not, however, measure the effective distribution of these products to the intended beneficiaries. Staff awareness, motivation, and training will strongly influence this process.

An additional process indicator of the adequacy of supply is the frequency of stockouts (i.e., the percentage of SDPs that experience a stockout of supplements at least once over a 12-month period).

For an additional discussion on indicators for Commodities and Logistics, see Part II.E.

Indicator

PERCENT OF PREGNANT WOMEN WHO RECEIVE THE RECOMMENDED NUMBER OF IRON/FOLATE SUPPLEMENTS DURING PREGNANCY

Definition

The percent of women who receive iron/folate supplements in accordance with local policy or protocols

USAID (1999) recommends at least 90 tablets of iron/folate during pregnancy. Alternatively, the IVACG/WHO/UNICEF (1998) recommendations indicate that pregnant women should receive iron/folate supplements for at least six months of pregnancy (and for an additional three months postpartum if pregnancy anemia prevalence is > 40 percent).

This indicator is calculated as:

$$\frac{\text{\# of pregnant women who receive iron/folate tablet}}{\text{Total \# of pregnant women}} \times 100$$

Data Requirements

Information on the number of pregnant women who were issued iron/folate tablets during last pregnancy; the number of tablets issued; and the total number of women who gave birth in the reference period

Data Source(s)

Program statistics (most common source) or population-based surveys

Purpose and Issues

This indicator measures whether women who give birth in a given reference period receive the minimum number of iron/folate supplements in the form of tablets, based on local policy or international standards. If the source of data is a population-based survey, the evaluator should calculate the indicator for the last pregnancy.

Worldwide, iron deficiency is the most common nutrient deficiency, and pregnant women are especially vulnerable. Pregnant women need iron to support their enlarged blood volume, to provide for placental and fetal

needs, and to replace blood loss in childbirth. The fetus relies on maternal iron stores to create adequate reserves of its own, which in tandem with the highly reccessible iron in breast milk, will meet the iron needs of the normal birth weight infant through the first six months of life. Iron supplementation is particularly recommended during the second and third trimesters when iron stores become depleted over the course of pregnancy (Whitney, Cataldo, and Rolfes, 1998).

Anemia is defined as abnormally low hemoglobin concentration. The results are fatigue, weakness, headaches, apathy, pallor, and poor resistance to cold temperatures. Since pregnant women are especially vulnerable, providing iron/folate supplements is particularly important. Supplementation early in the pregnancy is desirable, particularly where deficiency levels are high.

Research also suggests that folate supplements taken at least one month prior to conception and continued throughout the first trimester of pregnancy can prevent neural tube defects. Such defects cause serious disabilities and infant mortality and commonly arise in the first weeks of pregnancy before a woman may realize she is pregnant.

This indicator captures the distribution aspect of iron/folate supplements, but not the actual consumption. Clients must receive appropriate counseling on why and how to take iron/folate supplements.

An alternative indicator that reflects the adequacy of the program in meeting the needs of specific clients is

- Number of tablets distributed per eligible client.

Indicator

PERCENT OF WOMEN OF REPRODUCTIVE AGE WITH ANEMIA

Definition

The percent of women of reproductive age who have anemia, which is an inadequate level of hemoglobin

WHO (2000b) has defined anemia as mild, moderate, or severe based on the following cutoff values (g/dl) for hemoglobin level:

	Mild	Moderate	Severe
Pregnant	10-10.9	7.0-9.9	<7.0
Non-Pregnant	11-11.9	8.0-10.9	<8.0

In short, pregnant women with a hemoglobin level less than 11g/dl and non-pregnant women with a level less than 12g/dl are considered anemic.

Note: Evaluators may use mean hemoglobin (a continuous variable) instead of the above categories of mild, moderate, or severe (the same information in categorical form).

This indicator is calculated as:

$$\frac{\text{\# of women who have anemia}}{\text{Total \# of women between the ages of 15-49}} \times 100$$

Data Requirements

Hemoglobin concentration measures on a sample of women of reproductive age (or of women included in a surveillance system), including both pregnant and non-pregnant women

Data Source(s)

Population-based surveys or surveillance

Purpose and Issues

Anemia is a condition in which an inadequate number of red blood cells or an inadequate amount of hemoglobin prevents the body from functioning properly. Hemoglobin is a protein in red blood cells that carries oxygen to the brain, muscular system, immune system, and other parts of the body. Inadequate oxygen reduces the physical and mental capacity of individuals.

Over 40 percent of non-pregnant and 56 percent of pregnant women in lesser developing countries are anemic (ACC/SCN, 2000b). In industrialized countries anemia also affects women, especially those of lower socio-economic status. Iron deficiency is the primary cause of most anemia in poor environments. Progressive loss of iron stores leading to functional-tissue iron deficiency precede the occurrence of iron deficiency anemia. In addition to iron, other nutritional deficiencies (e.g., folate, vitamin B-12, and vitamin A) can cause anemia, as can non-nutritional factors such as acute and chronic infections (malaria, hookworm, HIV) and genetic conditions such as thalassemia and sickle cell trait.

Various factors may influence estimates of anemia prevalence, including sex, age, pregnancy status, and altitude; thus, evaluators must adjust individual level data for these factors. Among women of reproductive age, adolescent girls and pregnant women are at most risk for anemia: adolescents because of the onset of menstruation and pregnant women because of the increased blood volume associated with pregnancy. Severe anemia among pregnant women resulting from iron deficiency is associated with an increased risk of maternal and fetal mortality and morbidity and of intrauterine growth retardation (WHO, 2000b).

Additional laboratory tests, such as measurement of serum ferritin and/or malarial and parasitic egg counts, are necessary to determine if iron deficiency is the primary "cause" of the anemia. However, these tests are frequently impractical for field-based use. Until a simple, cost-effective test for measurement of iron deficiency is widely available and feasible for program application, the prevalence and distribution of anemia will continue to be used to estimate the extent, trends, and severity of both anemia and iron deficiency anemia at the population level.

This indicator is also useful for monitoring sub-populations (e.g., pregnant women, lactating women, women who receive antenatal care, women who receive post-partum care) and for evaluating interventions directed

towards these subgroups. Data should be disaggregated by age and reproductive status.

Gender Implications of this Indicator

There may be gender-related food taboos that contribute to high levels of anemia by denying women iron-rich foods. In addition, social norms may dictate the order in which family members eat, thus limiting women's access to iron-rich foods. It may be difficult for women to obtain iron folate supplements if they lack freedom of movement to travel to distribution points or lack access to household financial resources for transportation to distribution points or to purchase commodities.

Indicator

PERCENT OF WOMEN LIVING IN HOUSEHOLDS USING ADEQUATELY IODIZED SALT

Definition

This indicator, measuring the percent of women who live in households with iodized salt, is a proxy measure for the number of women who may be receiving adequate amounts of iodine.

“Adequately iodized salt” is defined as salt containing 15+ ppm of iodine.

This indicator is calculated as:

$$\frac{\text{\# of women who live in households with salt containing 15+ ppm of iodine}}{\text{Total \# of women}} \times 100$$

Data Requirements

Results of testing household salt used for cooking and/or as table salt

Data Source(s)

Population-based household surveys; the testing of households using iodized salt is part of the core questionnaire in the DHS and in other surveys such as MICS.

Purpose and Issues

Iodine deficiency disorders (IDD) are prevalent throughout the world and affect over 570 million people, mainly in developing countries (WHO, 1993). IDD interventions often focus on women of reproductive age because

of their increased need for iodine during pregnancy. Iodine deficiency in pregnancy may impair the development of the fetus, and thus may cause extreme and irreversible mental and physical retardation known as cretinism (Whitney, Cataldo, and Ross, 1998). Mild deficiency is very common and probably has harmful effects.

The purpose of this indicator is to evaluate the availability of adequately iodized salt in a given population. Salt is the main food seasoning among people all over the world. Iodization of salt, therefore, is the most effective means of ensuring that a population receives adequate amounts of iodine. Moreover, iodizing salt is relatively easy and low cost.

This indicator is a proxy for iodine status, given the difficulty of obtaining the latter from large-scale surveys. Where the data permit, disaggregating by geographical/ecological zone and by socio-economic level is useful.

Indicator

PERCENT OF WOMEN WHO RECEIVE VITAMIN A SUPPLEMENTATION IN POSTPARTUM VISITS

Definition

The percent of breastfeeding and non-breastfeeding women who receive two high dose supplements (200,000 IU per dose) of vitamin A within six weeks of giving birth

This indicator is calculated as:

$$\frac{\text{\# of women receiving two high-dose supplements within six weeks of delivering}}{\text{Total \# of women who deliver within a given reference period}} \times 100$$

Data Requirements

The total number of births during a given reference period and the number of women receiving two high-dose vitamin A supplements within six weeks of delivering

Data Source(s)

Program statistics (usual source) or population-based surveys, such as MICS, DHS, and KPC (possible alternative source)

Purpose and Issues

Vitamin A supplementation during lactation raises (and maintains) the concentration of vitamin A in the breast milk of women with vitamin A deficiency. Mega-doses of vitamin A, however, can potentially harm a fetus; therefore, women who could become pregnant must not receive vitamin A.

Different expert groups differ on the criteria for the “safe” infertile period after delivery during which a relatively high dose of Vitamin A supplement may be given. For example, the 1998 WHO/MI document on Safe Vitamin A dosage during pregnancy and lactation recommends that, in hyperendemic vitamin A-deficient areas, breastfeeding mothers receive 200,000 IU vitamin A within eight weeks of delivery – provided the woman is not pregnant. Non-breastfeeding women can be safely supplemented within six weeks of delivery. This level of supplementation will raise and maintain the vitamin

A content of breast milk and will offset the depleting effect lactation may have on the mother’s own vitamin A stores (ACC/SCN, 1994). The IVACG Informal Consultation on Vitamin A Supplementation, Yverdon, Switzerland, recommends a higher dose (400,000 IU), preferably given in two doses within six (for non-breastfeeding mothers) to eight weeks (for breastfeeding mothers). To avoid confusion among health personnel about the safe infertile period, PAHO currently advises that all mothers take two doses of the supplement (200,000 IU per dose and at least 24 hours between doses) within six weeks postpartum (PAHO, 2001). This recommendation is also advised by UNICEF.

Evaluators usually calculate this indicator from service statistics, but they can obtain it for the general population from population-based surveys. Evaluators should disaggregate findings for lactating versus non-lactating women (to ensure that the program is reaching both groups), also by urban/rural or by socio-economic level, if the numbers permit.

One potential problem in the calculation of this indicator is the clients may deliver at a different place from the one where they receive the supplementation. If the indicator is based on an overall figure for a district, it is generally more accurate than if it were based on the data from specific clinics. Similarly, it is essential to specify whether this indicator measures supplements distributed through outreach workers to mothers delivering at home, or only those given at service delivery points.

Evaluators can adapt this indicator so that it refers to all women, not just to those in the post-partum period, to evaluate interventions aimed at all women through programs such as “Healthy Days” or “National Immunization Days.”

An alternative indicator reflecting the adequacy of the program in meeting the needs of specific clients is the number of capsules distributed per eligible client.

Indicator

PERCENT OF WOMEN WITH LOW SERUM VITAMIN A CONCENTRATION

Definition

The percent of women whose serum vitamin A (retinol) is less than 1.05 umol/l

This indicator is calculated as:

$$\frac{\text{\# of women with serum vitamin A <1.05 umol/l}}{\text{Total \# of women}} \times 100$$

Data Requirements

Levels of retinol in serum (note: plasma levels give comparable results, WHO, 1996c)

Data Source(s)

Population-based surveys

Purpose and Issues

Serum retinol has been the indicator used most often in making a biochemical assessment of vitamin A status. Methods are now available to measure serum retinol with only a finger stick (HPLC on 50 uL of serum and dry-blood-spot techniques are in use; other methods are under development).

As for validity, the relationship between serum retinol and vitamin A status as indicated by total-body reserves is complex and non-linear. Vitamin A circulates in blood as retinol bound to its specific carrier protein, retinol-binding protein (RBP). The level of retinol in the blood is under homeostatic control over a broad range of body stores and reflects body stores only when they are very low or very high. Since RBP is an acute phase protein, acute and chronic infections can make interpretation of serum retinol levels difficult. Thus, serum concentration is not a valid indicator of vitamin A deficiency in individuals, but a frequency distribution of serum retinol concentrations can be informative for populations (WHO, 1996c).

Collecting blood samples is clearly essential for using this indicator. Because the ease of collecting blood samples varies by setting (e.g., it is particularly difficult in populations with high prevalence of HIV), the practicality of this indicator is limited.

Cut-off points for serum retinol to indicate vitamin A deficiency have been established more firmly for children than for women. The cutoff point used most commonly for adults is 1.05 umol/l, although some have used the same cut-off point recommended for children — 0.7 umol/l. The major justification for this cutoff point is based on data from the NHANES survey of the US population presented by Pilch (1987). This study suggests that serum retinols increase with age; for those aged 8-74 years, concentrations between 0.7 and 1.05 umol/l may improve with increased consumption of vitamin A, and some individuals with these concentrations may exhibit impairment of function. Evaluators may find it prudent, depending on the purpose of the survey, to present data using both cutoff points and so allow comparisons with the results of almost all surveys.

An alternative measure of vitamin A in lactating women is based on vitamin A concentration in breast milk. Breast milk retinol is very useful in evaluating vitamin A interventions because it has been shown to be the biochemical indicator most sensitive to measuring the impact of vitamin A interventions (Stoltzfus and Underwood, 1995). Logistical difficulties in maintaining the sample under the necessary temperature conditions make it less feasible for use in the context of large-scale population surveys. Thus, vitamin A concentration in breast milk is not included as a separate indicator in this *Compendium*.

Indicator

PERCENT OF WOMEN WITH NIGHT BLINDNESS IN LAST PREGNANCY

Definition

The percent of women who had night blindness during the last pregnancy

Maternal night blindness is marked by impaired scotopic (adjusting to dim light) vision during pregnancy that commonly recurs during repeated pregnancies and occasionally extends into the postpartum period (Christian et al., 1998a).

A prevalence rate of night blindness in pregnant women higher than five percent signals that vitamin A deficiency is a problem of public health significance in that population.

This indicator is calculated as:

$$\frac{\text{\# of women who had night blindness during the last pregnancy}}{\text{Total \# of ever-pregnant women}} \times 100$$

Data Requirements

Self-report of the condition during last pregnancy. In areas where night blindness exists, qualitative research needs to be conducted to determine the local term or description of symptoms for night blindness in that area. Evaluators need to distinguish impaired vision in dim light from impaired vision in daylight.

Data Source(s)

Population based surveys (e.g., DHS, MICS)

Purpose and Issues

Maternal night blindness is an indicator of severe vitamin A deficiency. Information on the validity of the indicator comes mainly from a study of low-dose supplementation with vitamin A or B-carotene to women of reproductive age in Nepal (West et al., 1999).

Supporting its validity as an indicator of maternal vitamin A status, night blindness in pregnancy was strongly

associated with low retinol in serum and breast milk, abnormal conjunctival cytology, and impaired dark adaptation (Christian et al., 1998a). Furthermore, the incidence of maternal night blindness was reduced by two-thirds with vitamin A interventions, providing causal evidence that the night blindness resulted from vitamin A deficiency (Christian et al., 1998b).

Night blind women carry considerably greater risks for health and survival than non-night blind women do. In the Nepal study, pregnant women reporting night blindness were more likely to be anemic, ill, acutely undernourished and to be consuming a nutritionally poorer diet (Christian et al., 1998a). They were also at higher risk of mortality than others were (Christian et al., 2000). Maternal night blindness was associated with a four-fold higher risk of all-cause mortality for up to two years following the night blindness.

A history of night blindness is easy to obtain when a local term exists for the condition, but interviewers must ask questions concerning the history in a standardized format. Those analyzing the data must exclude cases of night blindness that report daytime vision problems. Because night blindness tends to occur in the later part of pregnancy, surveys that measure night blindness among currently pregnant women will usually underestimate the prevalence. Considering other characteristics of the condition, Christian (2000) has proposed eliciting the history of night blindness only from women whose last pregnancy ended in a live birth, and that this question be restricted to births in the last three years.

Because of health and survival risks associated with maternal night blindness, cases identified during antenatal clinics should be treated immediately (WHO recommendation is to treat with 10,000 IU/day or 25,000 IU/week for up to 3 months) or at least referred for treatment.

Maternal night blindness is now part of a core question in the DHS surveys. The data yield two indicators: per-

centage of women who report night blindness in the last pregnancy (in past three or five years) and an adjusted rate of percentage who report night blindness excluding those who report vision problems during the day. In low prevalence countries (less than five percent), because finding a widely recognized local term is difficult, the interviewers must be carefully trained to adequately describe the condition. The low prevalence of night blindness may necessitate large sample sizes to detect changes at the population level.

Recent DHS data from several African countries identified prevalences of night blindness that were lower than expected based upon other indicators of vitamin A status in those populations. The five percent cut-off point for maternal night blindness used to indicate vitamin A deficiency in a population was based largely on data from Asia. At the time of writing, further work is underway to confirm the appropriateness of this cut-off point and the adjustment process for this indicator in Africa.

